

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A medical fluid ~~heater for heating a medical fluid,~~ device comprising:

an enclosure housing a medical fluid pump;

a radiant heater that emits energy in a direction towards the fluid pumped by the pump;

a secondary heater that emits energy in a direction towards the fluid pumped by the pump; and

the radiant heater and secondary heater housed by the enclosure so that a disposable fluid cassette can be positioned with respect to the enclosure to be heated by the radiant and secondary heaters; and

a controller that causes one of the infrared heater and the secondary heater to be powered at a first time and both the infrared heater and the secondary heater to be powered at a second time to maintain a desired temperature of the fluid pumped by the pump.

Claim 2 (currently amended): The medical fluid ~~heater~~ device according to Claim 1, wherein the infrared heater and the secondary heater are positioned to emit energy towards a same portion of the fluid.

Claim 3 (currently amended): The medical fluid ~~heater~~ device according to Claim 1, wherein the secondary heater is a plate heater.

Claim 4 (currently amended): The medical fluid ~~heater~~ device according to Claim 1, wherein the radiant heater includes an infrared reflector that directs the energy towards the fluid.

Claim 5 (currently amended): The medical fluid heater device according to Claim 1, further comprising at least one transmissive material disposed between the radiant heater and the fluid.

Claim 6 (currently amended): The medical fluid heater device according to Claim 1, wherein the secondary heater is positioned fluidly upstream of the infrared heater or fluidly downstream of the infrared heater.

Claim 7 (currently amended): The medical fluid heater device according to Claim 1, wherein the radiant heater emits a type of energy selected from the group consisting of: infrared, microwave, laser, ultraviolet, gamma, ultrasonic, radio frequency, inductive energy and combinations thereof.

Claim 8 (currently amended): A medical fluid therapy device for in-line heating of fluids flowing fluids through a disposable dialysis unit, the device comprising:

an enclosure configured to removably accept the disposable unit; and

an infrared heater having an infrared emitter positioned in a housing, the housing positioned within the enclosure and defining an opening facing the disposable unit when the infrared heater is in use unit is installed in the enclosure, the infrared heater having an infrared transmissive material covering the opening, and the infrared heater having an infrared reflector positioned relative to the infrared emitter such that infrared energy from the infrared emitter is substantially directed toward the infrared transmissive material.

Claim 9 (currently amended): The device for ~~in-line heating of~~ flowing fluids according to Claim 8, further comprising a plate heater adjacent the disposable unit.

Claim 10 (currently amended): The device for ~~in-line heating of~~ flowing fluids according to Claim 8, wherein the plate heater is positioned on an opposing side of the disposable unit from the infrared heater.

Claim 11 (currently amended): The device for ~~in-line heating of~~ flowing fluids according to Claim 8, further comprising an infrared absorption material positioned on an opposing side of the infrared transmissive material from the infrared heater, wherein the infrared absorption material increases in temperature from absorbing the infrared energy and heats the fluid in the disposable unit.

Claim 12 (currently amended): The device for ~~in-line heating of~~ flowing fluids according to Claim 8, further comprising an infrared reflective material positioned on an opposing side of the transmissive material from the infrared heater, wherein the infrared reflective material directs at least a portion of the infrared energy outside of the housing toward the fluid in the disposable unit.

Claim 13 (currently amended): A device for ~~in-line heating of a fluid~~ flowing a fluid through a disposable unit for dialysis treatment to a patient, the device comprising:

an enclosure housing a fluid pump and configured to removably receive the disposable cassette;

an infrared emitter so constructed and arranged with respect to the enclosure to heat at least a portion of the fluid in the disposable unit when the fluid is pumped by the pump;

a plate heater so constructed and arranged with respect to the enclosure to heat at least a portion of the fluid in the disposable unit when the fluid is pumped by the pump; and

a controller that causes at least one of the infrared emitter and the plate heater to achieve a desired fluid temperature.

Claim 14 (currently amended): A ~~fluid heating~~ device for ~~in-line heating of fluids~~ flowing a fluid through a disposable cassette having at least one flexible membrane, the device comprising:

an enclosure housing a fluid pump, the enclosure configured to removably receive the disposable cassette, the pump operable with a portion of the at least one flexible membrane;

an infrared emitter ~~having~~ positioned with respect to the enclosure so as to have an infrared emission in a ~~first~~ direction towards the cassette;

an infrared transmissive material disposed between the infrared emitter and adjacent the at least one flexible membrane of the cassette; and

a plate heater positioned with respect to the enclosure so as to be adjacent to the at least one flexible membrane of the cassette.

Claim 15 (currently amended): The ~~fluid heating~~ device according to Claim 14, wherein the enclosure is configured such that the infrared transmissive material and the plate heater are adjacent the same flexible membrane on one side of the cassette.

Claim 16 (currently amended): The ~~fluid heating~~ device according to Claim 14, wherein the enclosure is configured such that the infrared transmissive material and the plate heater are adjacent different flexible membranes on opposite sides of the cassette.

Claim 17 (currently amended): The ~~fluid heating~~ device of Claim 14, wherein the transmissive material is selected from the group consisting of: sapphire glass, optical glass, infrared glass, glass ceramics, borosilicates, aluminosilicates, fused silica (quartz), zinc sulphide, silicon, germanium, fluoride/bromide/chloride compounds and combinations thereof.

Claim 18 (currently amended): A device for flowing a dialysis fluid ~~heater for heating fluid in a fluid container~~, comprising:

an enclosure housing a pump and configured to removably receive a fluid container;

a radiant energy heater housed by the enclosure that heats at least a first section of a the fluid container, the radiant energy heater having a radiant energy emitting bulb and an apparatus that aids in directing radiant energy in a direction towards the first section; and

a second heater housed by the enclosure that heats at least a second section of a fluid container, the second heater having a heat transfer emission towards the second section;

wherein the dialysis fluid ~~in the~~ is pumped through the container by the pump and is heated by at least one of the radiant energy heater and the second heater when the dialysis fluid is moving through the container.

Claim 19 (currently amended): The dialysis fluid ~~heater~~ device according to Claim 18, wherein the dialysis fluid traveling at least at about 125 ml/min can be heated from about 5°C to about 37°C.

Claim 20 (currently amended): The dialysis fluid ~~heater~~ device according to Claim 18, wherein the first section of the fluid container includes at least one of (i) a reflective surface directed towards the radiant energy heater; and (ii) a transmissive material.

Claim 21 (currently amended): The dialysis fluid ~~heater~~ device according to Claim 18, wherein the first section of the fluid container has a different ~~volume~~ cross-sectional area than a second section of the fluid container, the different ~~volume~~ cross-sectional area in combination with the same amount of fluid flowing through the first and second sections causing different fluid velocities in the first and second sections.

Claim 22 (currently amended): The dialysis fluid ~~heater~~ device according to Claim 18, wherein the second heater is configured to preheat the fluid, and the radiant energy heater is configured to heat the preheated fluid to a desired temperature.

Claim 23 (currently amended): A dialysis fluid ~~heater for heating dialysis fluid in a fluid container,~~ device comprising:

an enclosure housing a pump and configured to removably receive a fluid container;

a first heater housed by the enclosure; and

a second heater housed by the enclosure and cooperating with the first heater to heat the dialysis fluid pumped by the pump;

wherein the first and second heaters are configured to heat at least about 2 liters of the dialysis fluid from about 10°C to about 37°C in about 13 minutes.

Claim 24 (currently amended): The dialysis fluid ~~heater~~ device of Claim 23, wherein the first and second heaters can achieve a desired fluid temperature within about plus/minus 0.5°C.

Claim 25 (currently amended): The dialysis fluid ~~heater~~ device of Claim 23, wherein the first and second heaters are provided adjacent to a disposable cassette.

Claim 26 (currently amended): The dialysis fluid ~~heater~~ device of Claim 23, wherein the first and second heaters are of a different type.

Claim 27 (currently amended): A dialysis system comprising:
an enclosure housing a pump;
a fluid flow path configured to flow fluid pumped by the pump;
a radiant heater housed by the enclosure that heats at least a portion of a dialysis fluid traveling along the fluid flow path; and
a second heater housed by the enclosure of a different type than the radiant heater that heats at least a portion of the dialysis fluid traveling along the fluid flow path.

Claim 28 (currently amended): The dialysis system of Claim 27, further comprising a controller that selectively energizes at least one of the radiant and second heaters to achieve a desired temperature for the dialysis fluid.

Claim 29 (currently amended): The dialysis system of Claim 27, wherein the radiant and second heaters are placed in a device that additionally acts to transfer the dialysis fluid along the fluid flow path.

Claim 30 (currently amended): ~~An in-line fluid heating~~ A dialysis system for use with a disposable dialysis fluid flow container, ~~the in-line fluid heating system~~ comprising:
an enclosure housing a fluid pump;
a controller housed by the enclosure;
a radiant energy heater operatively connected to the controller, the radiant energy heater having positioned within the enclosure so as to have a radiant energy emission towards the disposable fluid flow container in the dialysis system when operated by the controller;

a second heater operatively connected to the controller, the second heater ~~having~~ positioned within the enclosure so as to have a heat energy emission towards the disposable fluid flow container in the dialysis system when operated by the controller; and

a temperature sensor coupled operably to the controller and having a signal indicative of a sensed temperature of a dialysis fluid pumped by the pump, the controller operable with the temperature sensor to cause power to one of the radiant energy heater and the second heater to be varied as needed.

Claim 31 (currently amended): The ~~in-line fluid heating~~ dialysis system according to Claim 30, wherein the fluid flow container is operable with at least one valve.

Claim 32 (currently amended): The ~~in-line fluid heating~~ dialysis system according to Claim 30, wherein the controller receives inputs from a plurality of temperature sensors that sense dialysis fluid temperatures.

Claim 33 (currently amended): The ~~in-line fluid heating~~ dialysis system according to Claim 30, wherein the fluid flow container is configured and arranged to collect gas released from heated dialysis fluid.

Claim 34 (currently amended): The ~~in-line fluid heating~~ dialysis system according to Claim 30, wherein the fluid flow container is operable with at least one pump.

Claim 35 (currently amended): The ~~in-line fluid heating~~ dialysis system according to Claim 30, wherein the fluid flow container is fluidly connected to a bulk dialysis fluid container.

Claim 36 (currently amended): The ~~in-line fluid heating~~ dialysis system according to Claim 30, wherein the fluid flow container fluidly connects to a catheter disposed within a dialysis patient.

Claim 37 (withdrawn): A method of heating dialysis fluid, comprising the steps of:

flowing the dialysis fluid through a disposable fluid conduit;
applying energy from a 2-dimensional heat energy source to the dialysis fluid in the disposable fluid conduit; and
applying energy from a 3-dimensional heat energy source to the dialysis fluid in the disposable fluid conduit.

Claim 38 (withdrawn): The method of heating dialysis fluid according to Claim 37, wherein applying energy from the 3-dimensional heat energy source includes employing at least one device that reflects or absorbs the 3-dimensional heat.

Claim 39 (withdrawn): The method of heating dialysis fluid according to Claim 37, wherein applying energy from the 3-dimensional heat energy source includes cooling the 3-dimensional heat source.

Claim 40 (withdrawn): The method of heating dialysis fluid according to Claim 37, further comprising the step of controlling operation of the 3-dimensional heat energy source and the 2-dimensional heat energy source with a controller such that a selected one or both of the 3-dimensional and 2-dimensional heat energy sources heat the dialysis fluid.

Claim 41 (withdrawn): The method of heating dialysis fluid according to Claim 37, wherein the step of flowing the dialysis fluid further comprises flowing the dialysis fluid past the 2-dimensional heat energy source and subsequently flowing the dialysis fluid past the 3-dimensional heat energy source.

Claim 42 (withdrawn): The method of heating dialysis fluid according to Claim 37, wherein the 3-dimensional heat energy source is a radiant heater.

Claim 43 (withdrawn): A method of in-line heating of dialysis fluid, comprising the steps of:

flowing the dialysis fluid through a disposable fluid conduit;

heating the dialysis fluid with a plate heater as the dialysis fluid in the disposable fluid conduit flows past the plate heater; and

heating the dialysis fluid with an infrared heater as the dialysis fluid in the disposable fluid conduit flows past the infrared heater.

Claim 44 (withdrawn): The method of in-line heating of dialysis fluid according to Claim 43, wherein flowing the dialysis fluid includes continuously flowing the dialysis fluid.

Claim 45 (withdrawn): The method of in-line heating of dialysis fluid according to Claim 43, wherein the steps of heating the dialysis fluid with an infrared heater and heating the dialysis fluid with a plate heater include heating a same portion of the dialysis fluid.

Claim 46 (withdrawn): A method of providing dialysis to a patient needing same, comprising the steps of:

heating a dialysis fluid with a radiant heater and a second heater; and
passing the heated fluid into a portion of a patient.

Claim 47 (withdrawn): The method of Claim 46, wherein the portion includes a peritoneal cavity of the patient.

Claim 48 (withdrawn): A method of providing continuous flow peritoneal dialysis to a patient, comprising the steps of:

heating a dialysis fluid with a radiant heater and a second heater;
passing the heated fluid into a portion of a patient; and
recirculating the fluid from the patient and cleaning the fluid.

Claim 49 (withdrawn): The method of Claim 48, which further comprises reheating the recirculated fluid if necessary with at least one of the radiant heater and a second heater.

Claim 50 (withdrawn): A method of providing dialysis to a patient, comprising the steps of:

heating a dialysis fluid with a radiant heater and a second heater; and
infusing the heated fluid into a sleeping patient.

Claim 51 (withdrawn): The method of Claim 50, which includes infusing the heated fluid into the patient at nighttime.

Claim 52 (withdrawn): The method of Claim 50, which includes heating the fluid while the patient is sleeping.

Claim 53 (currently amended): The medical fluid ~~heater~~ device according to Claim 5, wherein the transmissive material is in contact with a fluid flow cassette that holds the fluid, the transmissive material and the fluid flow cassette capable of conducting energy to the fluid.

Claim 54 (currently amended): The ~~in-line heating~~ device of Claim 13, wherein the plate heater includes an infrared absorption material that faces the infrared emitter, the absorption material increasing in temperature as it absorbs infrared energy.

Claim 55 (currently amended): The dialysis fluid ~~heater~~ device according to Claim 18, wherein the bulb has at least one characteristic selected from the group consisting of: (i) being a tungsten filament bulb; (ii) operating at a color temperature above 2000°K; (iii) having a peak emission spectrum between one and two microns in wavelength; and (iv) providing infrared energy extending beyond five microns in wavelength.